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ENERGY VERSUS THE ENVIRONMENT: THE ISSUES

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CHICAGO UNIVERSITY
CHICAGO, ILLINOIS

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ENERGY VERSUS THE ENVIRONMENT: THE ISSUES



ENVIRONMENTAL POLLUTANTS AND THE URBAN ECONOMY

The University of Chicago
Center for Urban Studies

Argonne National Laboratory
Energy and Environmental Systems Division

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DORIS B. HOLLEB
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1975

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ENVIRONMENTAL POLLUTANTS AND THE URBAN ECONOMY

The University of Chicago
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INTRODUCTION

Newly-emergent policies of the oil-producing nations of the world have had profound effects on international affairs, and on the economic conservation policies of the United States. Dire predictions of insufficient energy resources in some far-distant future have been swiftly transformed into immediate national concerns. In consequence, the priorities and timetables for executing new environmental protection programs have been gravely threatened.

The papers presented in this volume explore various facets of the sharpening policy debate relating to the conflict between energy demands and environmental goals. In broad terms, this conflict involves, on the one hand, uncertain prospects for meeting larger energy demands in light of the world oil situation, limited availability of other fuels, and high costs to develop new technologies; and on the other hand, demands for conservation of natural resources, an improved quality of life, and minimization of risks of upsetting the ecological balance. The problem involves potential tradeoffs between short- and long-run energy and environmental goals, legislative and administrative constraints, and the need to choose among policy approaches, including regulation, taxation, pricing and technology development.

The problem arises from the inability to separate the production of energy from the creation of pollutants. There is apparently no way to produce energy that does not create pollution in some form and some quantity. Control measures only relieve, but do not eliminate, emissions. In formulating policy the following questions must be answered: How much of this joint production and pollution activity should be allowed at all? To what extent and by what methods should harmful effluents be controlled?

The conflict between energy production and environmental quality is a concrete rather than purely conceptual problem, and it involves many groups and individuals with widely divergent perspectives and attitudes. The breadth of backgrounds represented in this symposium reflects this diversity.

Louise Rome, of the Illinois League of Women Voters, sharply delineates one aspect of the problem in urging "... that immediate public health and welfare needs and long-term land use planning decisions must take precedence over short-term industrial gains." Mrs. Rome's remarks clearly reflect the concern for the public welfare that is involved in the search for adequate responses to the crisis regarding energy sources, production and utilization.

Theodore Eck, of the Standard Oil Company of Indiana, strikes a hard note in raising the question of the extent to which "through government mismanagement, overmanagement, or inaction, we have permitted our country to get into a situation where we literally have less energy than is needed to meet our requirements." Further, he raises the volatile issue of whether or not "... the environmentalists have really damaged the environment . . . by obstructing the construction of the Alaska pipeline, by prohibiting drilling for oil in the most prolific areas (particularly offshore), [and] by creating obstacles to the coal industry that have prevented a satisfactory level of investment. . . ."

It is not necessary to pass judgment on such observations in order to recognize that controversy is unavoidable as adequate solutions are sought to the problems presented by the current energy situation. Confronted with such seemingly irreconcilable positions, Professor George Tolley, of the University of Chicago's Economics Department, notes that "Professional economists who become involved in the environment often find themselves as the man in the middle." Responding, he re-formulates the policy questions as "*How much* shall we clean up the environment?" and "*How* shall we do it?" He finds that approaching these questions provides valuable insights as to how the seemingly divergent environmentalist and maximum energy development positions can be reconciled.

These three stances—those of an environmentalist, a private industrialist, and an academic economist—along with the others represented here, offer valid arguments in support of defensi-

ble positions. The problem is how to arrive at workable, balanced solutions to what is obviously a difficult and complicated situation. The answers will not be easy. It is hoped that these papers will be of assistance in the reader's attempt to understand the issues involved in the quest for solutions.

Thanks are extended to Doris B. Holleb, Director of the Metropolitan Institute of the University of Chicago, who was responsible for the

planning and success of the February, 1974, conference at which these papers first were presented, to Gary Alexander, who worked the conference transcript into a finished form, and to Adele Wick and John Gardner, who did final editing.

GEORGE S. TOLLEY
University of Chicago

ALAN S. COHEN
*Argonne National
Laboratory*

THE SUPPLY AND COSTS OF PETROLEUM

THEODORE ECK
Standard Oil Company

I have been asked to talk about supply and costs of petroleum, because of its strategic importance as a source of energy and as the point of departure for the subject of the day, which is "Energy Versus the Environment." First, however, I would like to emphasize that energy is actually *compatible* with the environment in the sense that, basically, in order to reduce our air and water pollution problems we are going to have to use more energy. Most forms of secondary and tertiary treatment of water, sewage, and the like, are really highly energy-intensive processes, so that it is going to take energy if we want cleaner air and water. Also, to consume energy in a cleaner form takes more energy. We can literally convert a whole ton of coal to methane, which is of course a much cleaner form of energy for consumption than is sulfurous, ash-laden coal. But this conversion costs us between twenty and thirty percent of the total energy of the coal. The same thing is true in the oil business. We can convert oil to 100 percent methane, or we can convert it to no-lead gasoline, or whatever, but again, this takes a great deal of energy.

Now this is one of our basic problems and the reason for today's conflict between the energy crisis and the environmental situation. Through government mismanagement, overmanagement, or inaction, we have permitted our country to get into a situation where we literally have less energy than is needed to meet our requirements.

Given such an energy shortage, doubtless we will be forced to consume energy in a more environmentally damaging way than we might otherwise prefer. In other words, we are not going to be able to afford to clean up coal to the full extent desired. At times we may even find it necessary to relax our minimum standards of environmental pollution. Moreover, we may not be able to heat as many homes electrically, because electric heating is thermally less efficient and we

have a total energy supply problem nationwide.

This brings me to another basic point, which is that perhaps the environmentalists have really damaged the environment. What I mean by this assertion is that by obstructing the construction of the Alaska pipeline, by prohibiting drilling for oil in the most prolific areas (particularly offshore), by creating obstacles to the coal industry that have prevented a satisfactory level of investment—by such activities as these, environmentalists have contributed to this very shortage, and their actions are going to result in consumption in a less environmentally satisfactory manner. So, in the end, in order to solve our environmental problems we have to increase our total available supplies of energy so that we can afford the luxury of consuming energy in a more environmentally satisfactory manner. I realize that these are controversial thoughts, but they pose an interesting way of looking at the problem, and unfortunately, they are the facts that we face.

I would like to take just a moment to discuss the short-term energy supply situation and then, specifically, gasoline, which is of tremendous interest to us all. In a way, we are almost living in a fool's paradise regarding this problem, because we have pulled a great deal of gasoline out of storage in the last few days in order to shorten the lines in Chicago and elsewhere throughout the nation. This action should not lead us to think that energy problems are over, despite contrary political announcements in this country. The withdrawals that we are now making from inventories are going to aggravate the problem this summer, for what we take out today we are obviously not going to have in the future.

We are operating our refineries at roughly 75 percent of capacity, as compared with virtually 100 percent of capacity a year ago. We are shipping gasoline at roughly 75 percent of the volume that we were shipping in 1972. That single

statistic should indicate why we have gasoline problems. If we are only shipping 75 percent of what we shipped two years ago, it is very clear that there is not enough gasoline available to satisfy everyone's demands.

What caused these cutbacks? They are due basically, of course, to a shortage of crude oil, primarily resulting from the cutoff of supplies from the Arab exporting countries. Is the situation going to get any better? We are going to be manufacturing somewhat more gasoline during the next several months as we shift from what we call our winter yield (to make heating oil) to our summer yield; but demand will also go up. In the spring people get out in their cars and use more gasoline driving to the tennis courts, lakes, golf courses, etc. However, the situation will not become substantially more difficult about June, when all the children get out of school and everyone goes on vacation. That is when we have an immense seasonal burst in gasoline demand. In fact, we are not going to be ready for it. We are just not going to have the gasoline unless something happens in the Middle East that permits or encourages the Arabs substantially to increase their crude oil exports. The entire situation this summer is contingent upon the restoration of access to Arab oil. If we do not get it, then there is no questioning the fact that we are going to have an extreme shortage this summer, a shortage which will result in most of us taking very short vacations. In fact, all sorts of things which you have read about in the papers could well happen.

Our real problem, though, from the standpoint of the total economy, may well arise next fall. Because we are shifting to summer gasoline yields very early this year, we are going to be down to a rock bottom inventory situation regarding heating oil by next September—unless, again, we get a step-up in crude oil deliveries from the Middle East. So we are really gambling as a country that somehow we are going to achieve a political accommodation with the Middle East. If we do not achieve such accommodation, then we will be in serious trouble in the heating season next year. We just are not going to have a margin to spare and we are going to be in an extremely serious situation.

Obviously gasoline prices have already gone up a great deal—on the average, about fifteen cents per gallon, a figure which corresponds al-

most exactly to the increase in world crude oil prices. The Arab countries have effectively tripled the price of oil. Our good friends the Canadians have also added about fifteen cents per gallon, a pure export tax, onto their deliveries to the United States. These increases effectively explain why the price has gone up.

I personally do not expect substantial additional increases in gasoline prices and think that we have pretty well seen the bulk of them. I doubt that we will have more than an additional five cents per gallon increase in gasoline prices through the end of this year, and it could be less. Somewhat surprisingly, one of the factors that would increase gasoline prices would be the restoration of Arab oil exports to the United States. The reason is that foreign crude oil is much more expensive than domestic oil, so that the more foreign oil we use, the higher is the average raw material cost for refined products, and therefore, the higher the cost of gasoline. Accordingly, if the embargo is lifted, we will have more products, but they will be somewhat more costly—again, on the order of five cents a gallon.

This suggests another policy issue, and that is whether or not we really should be attempting to import as much oil as possible. As a country, we could import a somewhat greater amount of refined products from Europe. However, gasoline bought in Europe costs us roughly seventy-five cents a gallon by the time it gets to the United States. There is a question of whether the American public is ready for seventy-five cent gasoline. A number of independent gasoline stations are buying this European gasoline and selling to the public at somewhat higher prices. The major oil companies, however, have been rather reluctant to go out and purchase this extremely high-cost gasoline, in part because of all the criticism that they are already getting about high prices. This is a basic policy issue that has not really been resolved.

Taking a somewhat longer view, I am optimistic that by about 1980, although we will not achieve the "Project Independence" goal suggested by President Nixon, things will look a lot better. The average wellhead price of oil is likely to go up something like 50 percent between now and the end of the decade, and I think that the pump price of gasoline will probably increase roughly ten cents over the average for this year. Alaskan oil will be moving south—actually it

should be on stream by about 1977 and will provide a great deal more oil. Fortunately, it appears that the environmentalists have essentially dropped their objections to offshore drilling. I think they are beginning to recognize that energy must come from somewhere and that offshore drilling is, in fact, an environmentally acceptable manner in which to get oil. Consequently, we will be drilling a great deal offshore and I think we will find a lot of oil. We will also be increasing substantially the physical recovery of oil from reservoirs. Much more recovery is economically feasible with prices in the eight- to ten-dollar-per-barrel range than at last year's three dollars. Shale oil will be commercially viable and available in increasing quantities by 1980. As far as I can see, the only really negative aspect of the supply picture is Canadian oil. The Canadians are definitely practicing a policy of atrophy. They are going to reduce exports to the United States sharply, and we will thus have much less Canadian oil.

Looking a bit farther down the road, I think that by 1985 oil from shale will be a major contributor of energy for the United States. We have immense shale oil resources, amounting to at least ten times the supply of conventional oil resources, and it appears that the technology is there to exploit these resources. I think you know that Standard Oil has joined in a \$210 million bid to acquire acreage in Colorado, and we think that this area is going to be a major contributor.

Coal is also going to provide gasoline, as well as a natural gas equivalent, for the longer term. Standard Oil forecasts that by 1990, if rational energy policies are practiced, this country can be completely self-sufficient in energy. We will not need to import any energy whatever from overseas sources unless we desire to do so for political or other reasons. Although this time frame is longer than we might desire, nevertheless we do have a capability of becoming self-sufficient, a potential which, considering the total balance of payments and political autonomy implications, must be a major policy objective.

I would just like to mention two areas of government policy that relate to our total longer term objectives. One is an Energy Emergency bill introduced by Senator Jackson which passed the Senate and the House of Representatives.

Among other things, this bill would sharply roll back the price of oil. My objections to this bill basically involve the fact that we have to pay for energy. From an environmental point of view there is no reason to subsidize the price of energy. It should be high enough to encourage rational conservation measures, and of course the price should be sufficiently high to permit the utilization of shale oil and coal liquids and all these other higher-cost forms of energy upon which we are going to have to rely in order to meet our total requirements. I think there is no question that the President must and will veto this bill, which really does the customer no good in the short run. It would roll back gasoline prices only by an estimated two cents a gallon, and this minor saving to consumers would come at a high price in terms of what it ultimately would do to our total self-sufficiency.

Another bill, introduced by Senator Stevenson, is designed to establish a government oil company. Standard Oil's position on this idea is that it, too, would very seriously damage our long-range energy potential. It would certainly discourage private initiative. For example, how could we raise money in the market if we were to say, "Well, we have one big competitor out there which we think you should know about—the government." We obviously would have real trouble raising money in that sort of environment. I think that the most specific question that can be asked regarding this proposal is the following: Can the country afford a postoffice-type department running its energy business? Face-tiously, one might assert that energy is too important a business to leave in government hands. In any event, it is fairly clear that private energy would not be able to compete on any reasonable basis with a subsidized government oil company. In effect, such a plan would not provide a reasonable level of investment.

To sum up, the hopeful sign that I would like to offer is that we have seen the worst of the price problems. We may not have seen the worst of the shortages, depending upon what happens to overseas oil availability, but longer-term options are very clearly available to us, in that we can be self-sufficient if we are willing to invest at a much higher rate and to use the synthetic fuel sources available to us.

ALTERNATIVE ENERGY SOURCES FOR THE FUTURE

JAMES P. HARTNETT

*Department of Energy Engineering
University of Illinois, Chicago*

In light of the problems related to petroleum as a source of energy, I have been asked to discuss our dependence on the prospects of alternative energy sources for the future. To put the issues into perspective, I call to your attention that the State of Illinois alone uses more energy than the entire country of India. In fact, it uses a considerably larger amount—more than many of the countries of the world. With only 6 percent of the world's population, the United States is using 30 percent of the world's energy.

Until recently, this energy has been coming to us very inexpensively, and consequently most engineering decisions, whether they are in the transportation sector, the commercial-residential sector, or the agricultural sector, have not really taken energy into account as a major factor. This situation appears to have changed drastically in the past six months. For example, in the future it is questionable whether buildings of the type that Mies van der Rohe designed would be acceptable.

Another factor is the energy growth rate which is almost twice the magnitude of our population increase. It is my judgment that this marked disparity will also have to change. I am not suggesting that the energy growth rate has to be precisely equal to the population growth rate, because clearly there has to be the possibility of upward mobility within the society, and in addition, one does have to allow for the development of new industry. On the other hand, the days of utilization of energy in a very wasteful manner—when you could develop bigger and bigger automobiles with greater and greater energy consumption, when you could fly in a commercial airplane that had 50 percent occupancy or even less than that, when you could move freight by plane when it could just as well be moved by train, when the country could permit its rail system to deteriorate seriously—these

days are over. The attitudes involved in such behavior will have to be modified, and I think that we are beginning to see constructive change in this direction.

Notwithstanding all of these comments about the need to utilize energy efficiently, we must also develop alternative energy sources. One fact is very clear: coal is our largest internal energy source. We have enough coal to last for hundreds of years. It is a national disgrace that we have done nothing appreciable to bring coal to the point where today we could use it in a variety of ways—to run power plants, to heat homes, or to run automobiles without polluting the environment. We have been derelict in our national duty.

The only major energy program that has come on line over the past twenty-five years is the nuclear program, and that, as we all know, needs some housekeeping. The safety of nuclear power plants has been seriously criticized by a number of citizens' groups, and the Atomic Energy Commission is not completely clean in this regard. This issue clearly must be straightened out, and I am certain that the efforts currently underway will do so.

Clearly, nuclear power will continue to play an ever-increasing role in satisfying some of our energy needs. At the same time, coal will begin to play a major role. Dixie Lee Ray has recommended to the Congress and the President that five coal gasification plants be funded, generating gas which has an energy content compatible with regular pipeline gas; that five liquefaction plants should be constructed; and that eight smaller, low-BTU gas plants could also be constructed. Financing of the proposed program calls for the private sector to match the funds provided by the federal government. The level of private funding required is so substantial that the coal industries may not be able to handle it. Some segments of

the coal industry have expressed concern that the oil industries will step in and take over the coal gasification and liquefaction program. Such a takeover, by the segment of the energy society which has the lowest level of public credibility, would pose a very serious problem.

Coal gasification and liquefaction processes are going to come on line in the next few decades, playing an increasing role in providing energy for us. The liquid metal fast breeder reactor is being developed by that socialist enterprise called the TVA and the free enterprise system called Commonwealth Edison, showing that on some occasions the marriage between a government corporation and a private enterprise appears able to work. The prototype liquid metal fast breeder reactor now being developed should come on line around 1980, and we can expect that the fast breeder reactor system will begin to provide a substantial amount of power somewhere before the end of the current century.

Another development is solar energy. In the near future, home space heating and cooling, which now use 18 percent of the total energy budget, can begin to utilize solar systems. These already exist. The federal government has recently funded four public school systems—one in Minnesota, one in Virginia, one in Maryland, and a fourth which I cannot remember—to bring in solar energy as an auxiliary source of power for the school system. One company has started to develop modular homes that are heated with solar energy. Thus we can foresee much-

increased utilization of solar energy, at least as regards heating and cooling, in the very near future.

I should also mention oil shale, a national source of great quantities of oil, which has not been developed in the past because of the low price of foreign oil supplies. Geothermal energy—energy from the interior of the earth—also has considerable potential for power production in the western part of the country.

Magnetohydrodynamics, which poses advantages from the standpoint of allowing us to go to much higher operating temperatures and much greater thermal efficiency, could come on line in the next twenty years. The Soviets have already developed one power plant outside of Moscow but are experiencing substantial engineering difficulties with it. Nevertheless, they have built the prototype, and it does function.

Finally, in the long range, fusion is of course possible, but that gets us into the next century, as do large-scale solar energy, large-scale fuel cells, etc. We can see these alternative energy sources as possible far down the trail.

These, then, are the major developments that I see. In the near future, we will look mostly to coal, the nuclear program, the liquid metal fast breeder reactor, and solar heating and cooling as alternative energy sources. As we await these new power sources it is extremely important to eliminate wasteful energy-use practices and to conserve as much of our valuable resources as possible.

CORRELATIONS BETWEEN GROSS NATIONAL PRODUCT, ENERGY CONSUMPTION AND AIR POLLUTION

JOHN J. ROBERTS
Argonne National Laboratory

In my remarks today I would like to deal with the "long shadow of Malthus." You are probably aware of the very strong correlation between GNP and the consumption of energy. Figure 1

imately ninety-thousand Btu's per dollar of GNP. Thus, for example, the \$4,000 per capita GNP in this country is equivalent to about four hundred million Btu's per capita in energy.

RELATIONSHIP BETWEEN GNP AND ENERGY CONSUMPTION PER CAPITA FOR 52 COUNTRIES-1970 DATA

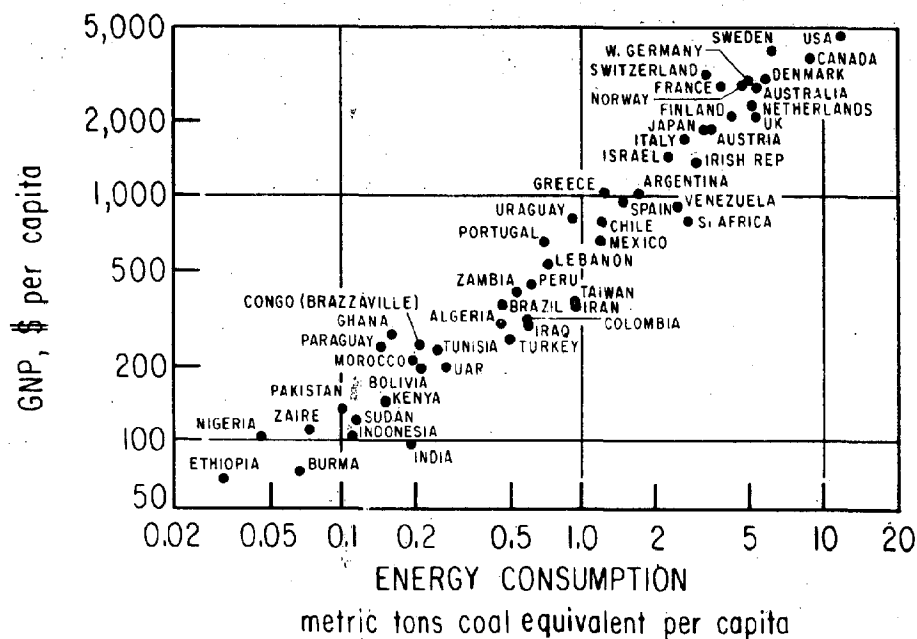


FIG. 1

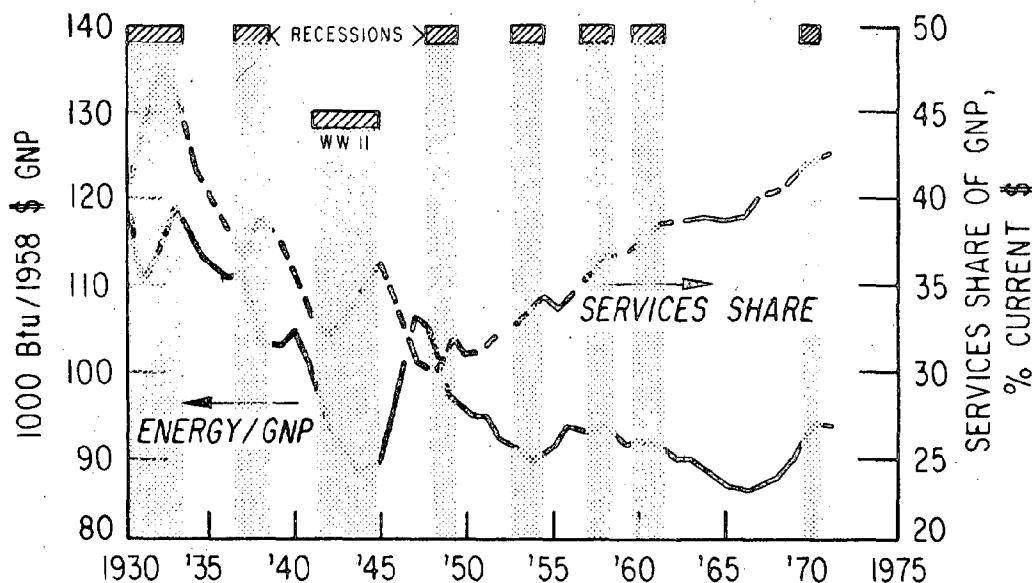
depicts per capita GNP and energy consumption levels for some fifty countries of the world. It shows that the two are nearly perfectly correlated. As Figure 2 shows, for a country to improve its status—its standard of living as measured by GNP—it requires more energy, approx-

whether gotten by coal, oil, gas, nuclear power, or some other source.

We can also establish some rough relationships between the energy requirements of the economy and pollution levels. I have made a pessimistic estimate of future air pollution levels

RELATIONSHIP OF U.S. PRIMARY ENERGY CONSUMPTION & GNP : 1930-71

Source: U.S. Bureau of Mines and U.S. Department of Commerce



REFERENCE: H.R. LINDEN, "REVIEW OF WORLD ENERGY SUPPLIES",
INSTITUTE OF GAS TECHNOLOGY, PREPARED FOR THE
12TH WORLD GAS CONFERENCE, FRANCE, JUNE, 1973

FIG. 2

assuming typical methods of generating energy in useful forms and ways of controlling the attendant pollution. I will discuss particulate pollution only, because I wish to convey concepts rather than specific numbers. Without controls on particulate emissions associated with the generation of electric power, we would produce approximately a thousand pounds of particulate pollution annually per capita. Actually, in Illinois in 1970 we were controlling about eighty percent of this potential pollution. Average urban area particulate pollution levels were then roughly 120 micrograms per cubic meter. In line with the Clean Air Act Amendments of 1970, the current Illinois air pollution control program calls for a greater than 95 percent removal of particulates, to less than fifty pounds per capita. According to the legislation, a primary (health-related) standard of $75 \mu\text{g}/\text{m}^3$ is to be attained by around

mid-1975 and a secondary (welfare-related) standard of $60 \mu\text{g}/\text{m}^3$ reasonably soon thereafter.

Expected initial gains associated with the Clean Air Act prior to 1980 are shown in Figure 3. This figure indicates anticipated suburban and urban particulate trends for the next fifty years. According to the figure, the primary particulate standards may be attained by 1980 in urban areas, and the secondary standards attained in suburban areas. We might have reached these goals earlier, but it is apparent that current energy-related legislation in the Congress will lead to relaxations of environmental standards.

From these low points in the particulate-pollution curves, I have projected what continued exponential growth in GNP of four percent per year might mean in terms of increased pollution levels. It is apparent that we may be headed back rather rapidly to where we were

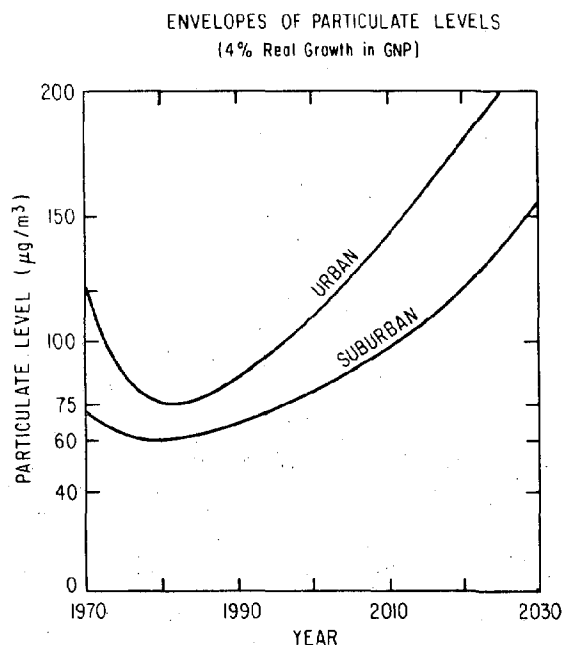


FIG. 3

prior to the Clean Air Act Amendments. We can anticipate similar trends for sulfur dioxide, oxides of nitrogen, thermal pollution, trace metal emissions, and water resource consumption.

My purpose in displaying this rather pessimistic upper bound on particulate levels is to focus attention on both the potential and the need for remedial actions. According to the second law of thermodynamics, one must take care that efforts to lower particulate levels do not result in unacceptable increases of other air and water pollutants, or significant additional resource depletion. As Mr. Eck mentioned in his earlier presen-

tation, one cannot control pollution without expending energy, but moreover one cannot expend energy without tending to generate more pollution. This no-win proposition is, in my opinion, a major fact of life as long as we accept the concept of exponential growth for the long-term future.

One other concern is that the curves in pollution levels indicated in Figure 3 include a background level. The particulate emissions of companies such as Commonwealth Edison and U.S. Steel, which are identifiable and controllable, are superimposed upon a general background of man-made and natural pollution involving such diverse inputs as automobile tire wear, road dirt, and farming activities. There is a very strong possibility that this background itself will increase in time. For example, if we double our crop yields by having two farming cycles per year, we may have significant increases in background particulate levels simply due to increased agricultural activities. (I doubt if we'll go back to mulching.)

We can, of course, lower the particulate curves by improving the efficiency of control equipment. We can design more efficient processes to generate and utilize energy. We can disperse pollution sources over the landscape, thereby trading air quality improvement in the large cities for environmental degradation in cleaner areas of the state. Most importantly, we can lower these particulate curves and other similar pollution and resource demand curves—by as much as 45 percent by the year 2000 under some scenarios—by reducing our consumption requirements.

WHAT IS ENERGY-RELATED POLLUTION?

V. S. HASTINGS

Environmental Analysts, Inc.

I was a little concerned about putting my approach together without having conferred with any of the other panelists, for fear that we might be saying the same things. However, what I have set forth is different from the other perspectives so far presented. I have taken the approach of asking "What is this topic? What is energy-related pollution?" This may be a naive question, but I think that some interesting things can be developed around it. What, then, is energy-related pollution?

I will begin as if we all knew and agreed on what pollution is, so that we can start thinking about the question without knowing or worrying too much about exactly what goes into, or might go into, that black box of pollution. The classic problem in this matter of categorization seems to be the one about thermal discharges. Should they be put into the black box of thermal pollution, the white box of thermal enrichment, or the neutral box of thermal effects? At least the argument used to run along these lines.

What then are the energy-related pollutants? First, of course, there is energy itself, which takes many forms; the one of chief concern being thermal energy. Of course there is radioactivity, but I would prefer to concentrate on thermal, which is currently receiving considerable attention. Ultimately all energy that we convert to usable forms winds up as heat. Both the waste heat in generating electricity, for example, and the energy that is produced—made into electricity—end up finally as heat; i.e., they radiate back into the atmosphere and as pollutants heat up the general environment.

There are two categories of possible concern here. One is local thermal pollution. The other is more general effects, resulting in heat island or global thermal effects. The first, the waste heat discharged, is the more conventional idea of a pollutant, but the second, the total thermal effect, actually reflects a more comprehensive

concept of the conflict between energy and the environment. That is, this latter effect represents the broader concept of the total environmental effect. Of course, what we come down to is that we can cover almost anything in the way of energy when we talk about the energy part of energy-related pollutants.

To continue, we have all the other energy-related pollutants, beginning with the strip mining and deep mining. We can include all the different fuels that we mine or drill, that is, coal, oil, gas and uranium. We can further include the mining for materials that go into the building of power plants and factories that use energy. And again, we can include not only the waste discharges from these operations, but also, under the more comprehensive concept of impact, the disruption of land and the use of all other resources in mining.

We can next consider the transportation of fuel and construction materials necessary to build the power plants and factories and those that are used in these facilities. Here again there are not only the emissions, including air pollution and noise from the locomotives and trucks, but also the other impacts: the land used for roads; the steel and concrete used in building the roads; the materials used in building and operating the power plants and factories; the emissions, here including air and noise; the effluents—thermal, chemical, biological; and the solid wastes that are produced. And there are still other impacts. As an example, Commonwealth Edison has come to realize that more than simply waste emissions are included under environmental concerns. The use of farm land for building a cooling lake was the primary concern in constructing its LaSalle County Station.

I raise this matter of what to include under the topic for discussion because if the issue we are considering is the conflict between the growth and use of energy and environmental protection,

then the latter is not merely a narrowly-defined attempt to avoid pollution. The concept of environmental protection certainly includes resource conservation in general, that is, the protection of land, water, and air. It also includes the protection of energy resources from wasteful use. This concept involves allocating to their best uses all resources—land, the steel and concrete used in construction, labor, energy resources, and even the institutional resources. The matter comes down to a concern with conservation through the best use of all our resources.

With all of this, it begins to look like an almost insurmountable problem to include all of these factors in any single consideration of the problem. The impact statements that are prepared for obtaining federal permits have grown larger and larger, being designed to cover in detail many more things than just the local environmental effects, the cost of a resource, or a benefit-cost analysis. The various things that are considered in these statements range from the mining and transmission of fuels to the ultimate uses of power and the many alternatives that can be considered, ranging from alternative sites to alternative ways of disposing of waste materials.

More than this, I think, the situation has become even more complicated by the development of another expansion in the concept, or, rather, a deepening of the concept of pollution. This deepening is reflected in the idea that any and all discharges are pollution and that in the long run no discharges can be tolerated. There is reflected in this idea a notion that any pollution or contaminant that can be feasibly eliminated should in fact be removed.

All of these complications raise the basic issue of how to handle such complexities. What we tend to get are what I would term proposals for extreme solutions. For example, the zero energy growth solution, or on the other hand, ignoring our environmental concerns and going all-out to supply the energy we need.

These solutions, however, further complicate by raising more issues, and valid ones, than they solve.

I think the real problem is that we have not really come to grips with the actual elements of the basic issues. It is this coming to grips that I propose we need to do.

I think the real problem is that we have not been able to determine or to communicate which problems are of legitimate and important concern, and which are not. For example, from my point of view, there has been too much concern with thermal impact. Section 316a of the 1972 Amendments to the Water Pollution Act indicates that others agree with this point of view, at least in part.

An assessment of just what are basic and important concerns represents a real problem and a real need. I do not agree, for one, that all discharges, thermal and other, are equally bad and should be equally eliminated. I do not think that such an approach is useful. Nor is it useful, in trying to solve problems, to argue that all discharges should be eliminated regardless of the other resource costs involved in eliminating them. I think that this is the kind of assessment that leads to terrible further complications that could have been taken into account in the original considerations of the situation.

We need to consider the elements of the issues and what the solutions are. It is easy to say that there should be government policy and implementation and zero energy growth, but I would like to suggest that we think more carefully about such questions as the following: Are there simpler and easier solutions? Are there ways of making the problems themselves less complicated? Can we focus on the important and relevant issues of environmental concern? What are the alternative solutions? Finally, are there simpler governmental solutions, and are there solutions other than by strict or extreme regulation?

THE IMPORTANCE OF CONSERVATION MEASURES IN DEALING WITH THE ENERGY CRISIS

LOUISE ROME

Illinois League of Women Voters

The League of Women Voters is deeply concerned that existing energy shortages will result in relaxation of the nation's commitment to the improvement of air and water quality, and to the destruction of large portions of the land under which the nation's coal reserves lie. We are concerned citizens who rank public health and welfare as economic priorities. We are unwilling to sacrifice the environmental gains of the past decade to a well-financed campaign to relax the standards established by the Clean Air Act and the regulations of water quality standards and goals—and I use the word goals advisedly—of the federal Water Pollution Control Act Amendments of 1972. We have said repeatedly that conservation of energy resources is essential to a cleaner, more healthful environment and we say to you, "Let us work on some conservation measures."

On the basis of public health needs, human welfare, and energy conservation, we are supporting the Regional Transportation Authority referendum as one legislative imperative which happens to fit our goals. By changing our wasteful, auto-oriented economy, we could conserve a big share of the 14.3 percent of our energy resources now devoted to the private automobile. Our legislative imperatives are further directed to enforcement of the Clean Air Act and the federal Water Pollution Control Act. We are justifiably outraged at some members of Congress and the Administration for their efforts to amend the Clean Air Act through the Emergency Energy Act.

We are opposed to mandatory fuel conversions for industrial and electric power plants which would permit air quality deterioration, particularly in highly congested urban areas. We oppose any Congressional or Executive effort to wipe out the right of states and local governments to set standards which are higher than the

federal standards. (I assume that the President has by this time vetoed the bill, so the argument begins all over again.)

The electric utility industry, already protected against financial losses in its rate structure, chose the low-sulfur fuel route instead of stack emission control, and now asks the public to accept the industry's negligence and to forfeit clean air and public health. The American Public Health Association has released part of its study on the effects of utility and administration proposals, and it concludes the following:

If we were to assume, as some are advocating, that 60 percent of those power plants now burning natural gas and oil convert to coal without adding more pollution control devices, then we can expect in this at-risk population of twenty-one million Americans an additional 45 percent increase in the attacks of chronic respiratory diseases, and an 8 percent increase in mortality attributable to the extra pollution caused by this conversion.

Further, the subject of sulfur dioxide removal has been raised, and I would simply state that the Sulfur Oxide Control Technology Assessment Panel report, which was jointly prepared by the U.S. Environmental Protection Agency, the Department of Commerce and the Office of Science and Technology, does say that SO₂ stack removal is available. It also points out that there are only twenty-two full size flue gas desulfurization facilities in the entire United States, two of which are in Illinois: Commonwealth Edison has one at Will County, and Illinois Power has one at Wood River. There is no reference in that particular report to the number of smaller research projects.

Maintenance of air quality is not the only casualty of the energy crisis. As the nation has

moved rapidly to expand its coal output to meet the utility demands, it has failed to face the problems of strip mining and land reclamation. The administration recently submitted its views on the Senate-passed Strip Mining Regulatory Act, which is now in the House. It opposed the Senate bill, saying that it could result in a 5 to 15 percent decline in coal production below the 1973 figures, and the administration needs an increase of 15 percent to fulfill the needs of twenty-six power plants requested to convert back to coal.

Current strip mining regulations do not protect the hydrological balance and they contribute to the destruction of recharge areas and stream channels. Nor do they require the restoration of topsoil, so that previous farm production can be restored. We cannot continue to destroy the shallow aquifers of central Illinois and to bury its topsoil under subsurface clay and rock, and expect to continue to produce row crops for American consumption and for export. We must demand that coal producers guarantee original agricultural uses after stripping.

Do we take the one-shot profit of Illinois coal without protecting the long-term benefit of Illinois agriculture? I think that this is a question which must be decided. The *Wall Street Journal* of February 25, 1974, reports that "Brokers quoted spot prices up to \$24 a ton at the mine for steam coal burned by utilities, up more than 150 percent from \$9 last August." Other types of coal reflect increases from 7 to 100 percent. Who is making the profit while strip mined lands lie fallow? Have the miners negotiated a new wage contract since last August? I did not see it. The answer lies buried in the financial statements of the conglomerates which now own the mines, for example, General Dynamics, Kennecott Copper, the oil and steel industries.

Let me now mention briefly the Federal Water Pollution Control Act of 1972, which may seem confused. It is less confused because of the intent of Congress and more so because of administration intervention to circumvent the intent of the law. To cite a few samples: *first*, the President has impounded 50 percent of the grant money appropriated for sewage treatment plant

construction for the years 1973, 1974, and 1975, and the Office of Management and Budget has slowed down the process of publishing guidelines in order that the remaining money not be spent. *Second*, the long-overdue thermal effluent standards—formal standards required by law—were delayed by direct White House intervention through Governor Love, who found no environmental need for effluent standards. Ironically, only a few months later, a million menhaden died off the New Jersey coast when the Jersey Central Power and Light nuclear plant was shut down for safety reasons and the water temperature suddenly dropped twenty degrees. (Other examples can be cited in this regard, but I think that these suffice to give some indication of the scope of the problem.) It should be noted that Mr. Love's action was in direct opposition to the recommendations of the United States Environmental Protection Agency's contractor, who recommended mechanical draft cooling towers. *Third*, the *Wall Street Journal* also reported that Roy Ash of OMB has intervened in the writing of all congressionally-mandated industrial effluent standards, and, *fourth*, that the President has removed the authority of the United States Environmental Protection Agency to set radiation standards, thus dealing another blow to public health. The League believes radiation standards should be set and enforced by an agency other than the Atomic Energy Commission, which promotes atomic energy. To compound the public insult, the AEC now proposes to meet the so-called energy crisis by speeding up construction of nuclear power plants and eliminating some aspects of siting and public review.

It is the intent of this brief statement to reiterate the League's position that the environment has been dealt, in the name of the energy crisis, a low blow by both industry and the federal administration. We believe that immediate public health and welfare needs and long-term land use planning decisions must take precedence over short-term industrial gains. We will continue to work for these goals with the hope that cool heads and reason will prevail in the public interest.

STATE AND FEDERAL IMPACTS OF THE ENERGY SITUATION

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I would like to review some of the ways in which this energy situation involves state and federal environmental policy-making. Let me begin by making a very sharp distinction between the "energy shortage" and the "energy crisis." To me, the energy shortage is a result of the fact that demand has grown exponentially while supply has leveled off. We all know this kind of shortage problem results from a difference between supply and demand. I think, however, that today's crisis is a crisis in power, not a crisis in shortage. The crisis exists because we have had no national energy policy—because the bureaucrats in Washington have been fighting over who should have the responsibility and the authority and who should wield the stick in the energy area, rather than concentrating on what needs to be done to solve the energy shortage problem. Even last week, for example, the Director of the Federal Energy Office publicly chastized the Director of OMB, the Office of Management and Budget, telling him to keep his "cotton pickin'" hands off of energy policy.

I would like to talk about some of the impacts of the energy crisis on environmental activities. I will do this first for the state and then I will move into the national area.

In Illinois, the Governor recently asked for an increase of \$100 million in pollution control bonding authority. This request is aimed at increasing the provision of tax-exempt bonds for industries—people who have pollution control problems—to buy and install pollution control equipment. The Governor also asked for \$100 million to provide flexibility of financing in order to be able to take advantage of opportunities that may be available to the State to conduct research, development, and demonstration programs. It should be understood that this sum would be a pool of money not necessarily to be spent, but to be available as seed money to

capitalize on opportunities that may arise. As a third example, last week it was announced that Northern Illinois Power Company, Northern Illinois Gas Company, and the State were tentatively planning to try to get a joint \$250 million contract from the Office of Coal Research.

The State's pollution control variance posture is a fourth area where its environmental activities have an energy impact. In January of last year, our agency publicly announced that it would be receptive to requests for variances from companies which have had difficulty getting clean fuel. "Good faith" is a critical element here. The nature of it is this. We ask: Has the company or the individual who says clean fuel is unavailable made a bona fide effort to find that clean fuel? Is he taking or proposing all possible reasonable steps to reduce his SO₂ emissions? Has he given substantial financial support to developing technologically feasible solutions to deal with his problems, or is he sitting back on his heels, waiting for someone else to solve his problem for him? How does his advertising budget compare with his budget for pollution control research and development? What did these budgets look like five or ten years ago? Has he demonstrated that his proposed solution is the best practical one from an environmental point of view?

Remember that in talking about a variance, we do not have in mind the idea that someone will not meet the standards. Rather, we are talking about an extension of the time in which a firm will comply with those standards. There is no question about eventually meeting them. The question is only whether or not the applicant is making all the progress that he realistically could be expected to make. Some of the considerations are subjective, but nevertheless they enter into the question of good faith, which to me is the critical item in variance requests.

For your information, we have had only

twenty-one requests in about the last thirteen months for extensions of time to comply with fuel standards. We have recommended to the Pollution Control Board, the governing body that eventually grants or denies the variances, that ten of these requests be granted, and five be denied. Six are still pending. The significant aspect of this is that we have only received twenty-one requests, while one might have expected hundreds.

I think that an environmental program must be realistic and practical if we are to make the progress that we all want and which we must have. Problems surface from time to time because of things like the energy situation, and we have to try to find ways of dealing with them. When this type of situation occurs, we have to look at it and ask whether we want to continue as in the past, or to consider other options. We have to look at these things realistically and attempt to obtain a workable solution.

Let me jump now to the federal program. So far, for all practical purposes, the energy crisis has not led to the relaxation of standards per se, but rather to extensions of allowable time for compliance. In the area of auto emissions, there is a proposal to extend by one year the 1974 interim emission control standards for hydrocarbons and carbon monoxide, with the possibility of further extensions up to three years. Switching from oil to coal has been encouraged through federal pressure, predominantly in the north-eastern states. Probably the blackest mark is the hysteria that took place in regard to Congress' outlawing of any further legal contest against the Alaska pipeline.

I think that what is important here at the federal level is not what has taken place in the past, but what we might expect to occur in the future. The energy bill which is before Congress looks like just an initial takeoff point against environmental sanity. Although a lot of people seem to consider that once this bill is passed we will be home free, I cannot agree at all with such an observation. I believe that the Federal Energy Office will make a major assault on the existing environmental regulations. A proposal is currently being circulated for review by the major agencies in Washington which would defer for five to ten years all energy-related environmental standards (health-related and secondary), remove all limitations on power plant siting, allow

offshore drilling and on-land mining of oil shale virtually without any regard for environmental constraints, and probably much more. To be sure, the best technology available would be required for environmental protection, but constraints on the drilling and mining per se would be eliminated. These are the ideas of Project Independence, which involves the achievement of energy sufficiency by 1980, and about which you will be hearing much more in days to come. It is unfortunate that in developing Project Independence, environmental considerations are being virtually ignored by the people who have the responsibility for the energy-sufficiency objective.

When I was with the Federal Environmental Protection Agency in Washington, I was involved in a movement that seemed to have a terrific long term payoff and which I thought of as the "three E's." Previously, Energy policy, Environmental policy, and Economic policy had been developed pretty much in isolation. But then, at the very highest level of government was taking place a real attempt to consolidate, coordinate, and integrate these three E's. Now we have seen a major shift in the Federal Energy Office, in which this whole spirit of cooperation has virtually disintegrated. It is disintegrating because of the change in the priorities involving a reasonable balance between the three E's. These priorities seem to have gone out the window, at least for the present.

Substantial parts of the automotive and oil industries have been waging a massive campaign to distort the facts about the energy costs of auto emission devices. As a reference point, consider that emission control devices for small cars of less than a nominal 3,500-3,600 pounds (that is sub-compacts up to some intermediates) have never increased the energy requirements of the cars. It is the big, luxury cars with their high-compression engines that have had the fuel penalty, which has ranged from about an 11 to 18 percent reduction in miles per gallon. In comparison, an automobile air conditioner in a humid climate on a hot day can reduce miles per gallon by 20 to 25 percent. So the question is simply, what are your priorities?

The Federal EPA has put out a little booklet called the "1974 Gas Mileage Guide for Car Buyers," which lists more than 400 automobiles tested by the EPA according to their fuel economy performance. Every car listed met all

applicable emission control requirements. The booklet, which lists the cars by weight class and ranks them according to miles per gallon, shows that if you want to buy a moderate-sized car, you can find one with good and with very poor economy. For example, intermediate-sized cars in the 3,500 to 4,000 pound categories have a range from twenty miles per gallon down to eight miles per gallon in performance. You can find a car of the size you want with good fuel economy which still meets the emission requirements.

One of my duties in the EPA in Washington was to act as an interface between my agency and the Department of Transportation, on mass transit in cities which have environmental problems and are required to have a transportation control plan. The Urban Mass Transportation Agency (UMTA) committed \$600 million explicitly for improved mass transit in those cities which had an air pollution problem. The difficulty was that UMTA had its own set of priorities for deciding how to spend its money, and environmental considerations did not play a major role. They were there on paper, but they were down on the list. For all practical purposes, environmental considerations had little or no impact on the distribution of money for dealing with mass transit problems. We did make some progress in this area; and although I do not know what the details of the federal program are now, I understand that some dollars are even going into operational subsidies for mass transit. This kind of action will be of substantial help in dealing with environmental pressures in our cities.

The last thing that I want to mention is the letter sent this month from the Office of Management and Budget to Russell Train, Administrator of EPA. This letter requires EPA to begin phasing out federal grants to state and local pollution control agencies beginning in fiscal year 1976. We do not know quite yet what "phase out" means, that is, whether it means "abruptly terminate" or "gradually eliminate." My guess is that it means the former. We are not talking here about construction grant funds for sewage treatment plants. We are talking about roughly \$3 million out of my \$11½-12 million operating budget for monitoring, program implementation, etc. The federal government wants the states to

have self-sufficiency in this area, which, I think, is a pleasant way of saying that this crucial federal support is to be phased out starting in fiscal year 1976.

It is interesting to note that along with this idea of self-sufficiency went provision of \$112 million for developing technology to control pollution emissions from energy sources, and \$74 million for assessing the effects of these pollutants. This redirection of emphasis, I believe, is not all bad from an environmental point of view. That the states are to become self-sufficient in pollution control activities means that we must assume the financial burden of doing our work, or else back off and reduce the level of our activities by 25 percent. Perhaps more important is the fact that previous state pollution control funds will be redirected to energy efforts. Thus, in a sense we are not taking federal dollars out of environmental activities because OMB is saying that these dollars should be directed to energy efforts rather than to the state pollution control programs.

Let me conclude by stating two truisms which I very strongly believe. First: Environmental policy did not cause the energy crisis, shortage or whatever you wish to call it. Second: Changes in environmental policy are not going to solve the energy shortage. No matter how much those who have consistently fought against any kind of environmental progress would have us believe that the environmental movement has caused the energy shortage, they still must face the fact that this nation presently has a regressive environmental and energy policy.

I think we all must be aware that this assault against environmental progress is going on, and that there is a very strong movement by people who are opposed to environmental progress to make the environmental movement a whipping boy, a scapegoat, for problems which are not caused by environmental constraints. These are problems which, in the long run, we can have a lot to do with helping to solve. But environmentalists should not be forced to capitulate because of "crisis" conditions like getting projects approved such as the Alaska pipeline bill. This is not the way to make the sustained progress which we all want.

THE SPATIAL ASPECTS OF POLLUTION

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Professional economists who become involved in the environment often find themselves as the man in the middle. Let us go back seventy years and consider an economist whom I think is now known to anyone who ever takes a course in economics, A. C. Pigou. He lived in England in the nineteenth century and was worried about the smoke in that country. He began looking at the smoke coming out of the factories and rather unhappily described the situation in this way: "There is a divergence here between social and private costs." This is a good assessment, but it started a line of thinking that constituted an attack on his predecessor of almost exactly a hundred years earlier, Adam Smith, who had said that "The free hand invisibly makes everybody as well off as they could be." That is, it makes the total size of the economic pie as large as necessary. Pigou, speaking a hundred years later, finally said, "Now, wait. That is true only if the private cost equals the social cost."

Ever since then, a significant part of the thinking of economists, especially theoretically-minded ones, has been on this topic. If you know any economists and want to get them excited, start talking about this issue. You will find that they express great interest, but further, they tend to talk about it in very theoretical terms. This latter habit is frustrating when one is trying to decide what specific actions to take regarding the environment.

Until ten or twenty years ago, professional economists were among those saying that we ought to do something about the environment, the basic logic being that there are costs that the individual decision-maker does not have incentives to take into account. So there are gains to be made in cleaning up the environment.

In more recent years, the swirl of environmental actions has occurred, and to many environmentalists it appears that to a great extent the

swirl has gone by the economists. This is why I say that the economist finds himself caught in the middle. To oversimplify, at the one extreme are people who tell us to do nothing about the environment, while at the other extreme are those supporting a zero pollution approach which says to clean up everything. Much of what we are hearing today represents a tug-of-war between these two poles of thinking.

Economists tend, in such a contest, to be in the middle, observing that the question is not one of *all vs. nothing at all*. Rather, it is a question of *how much*? This is one of the *first* questions that the economist asks. How much shall we clean up the environment? The *second* question is *how shall we do it*? What are the trade-offs between the various ways that we can get things cleaned up? It seems to me that these two questions offer a framework for talking realistically about solutions.

The "how much" question is often answered by saying, "We should compare the benefits of various actions to cleaning up the environment with the costs." In the long run we can do much more on this than we are doing in the short run. We properly have to act in the present on the environment, and yet we have a really amazing lack of knowledge about what is going to help, as well as about the aesthetic and ecological effects of various actions on the environment. So society and Congress have chosen the standards approach: not knowing just what the benefits of cleaning up the environment are, we will say that we have a target as to how much of this kind of particulate matter, for example, that we are going to allow. In the longer run we can be more precise about this choice, but anyone who has been working on what the damages are, as I have, finds that it is certainly difficult to put numbers on these things. Thus the "how much" decision is being decided by the standard-setters.

This has provided the answer to the economist's first question: since we do not have exact answers, we will simply pick a number.

Moving on, we come to the "how" question, which involves choosing among the various ways that it can be done. To take the example of air pollution, there are three major methods. One way is to lower the pollution coming out of the production process by changing the type of fuel, or input. The increasing use of low sulfur coal that comes from Wyoming and Montana exemplifies well this approach to controlling pollution. If this were a very easy path, then we could do the whole thing this way. However, there is a cost of substituting low-polluting fuels for high-polluting ones.

A second way of controlling air pollution is through the use of scrubbers, control devices, or stack height—anything to change the mechanism at the production site so that a given amount of production has less pollution. Much of the shouting has been about the high cost of this way of controlling pollution.

The third of the three ways to reduce pollution is to locate polluting activities where they will do the least harm. This, the siting aspect of the problem, has been the most neglected.

In sum, a useful approach to looking at the pollution problem is to say, "We have some standards here that we have decided to meet. Let us choose the combination of the three ways of meeting these standards that involves the least cost." This leads to consideration of the trade-off between doing it by fuels, through pollution control devices, or location of activities.

Many are skeptical about the trade-off approach. As mentioned above, there are those who say either do nothing or do everything. Why worry about these subtleties? In rebuttal, consider that there has been a tremendous impact on the environment in the past five or ten years as a result of introducing environmental controls. We have already done the easy things. Where do we go from here? The problem is starting all over again. What are we going to do now, especially given that these choices are going to get a lot harder than they used to be?

In requesting that I speak, Doris Holleb asked me to emphasize the spatial aspects of pollution, the third of the three ways of controlling pollution. I am happy to emphasize this issue for two reasons: (1) it is a relatively neglected path to controlling pollution; (2) my colleagues and I at

the University of Chicago and the Argonne National Laboratory have been working on this problem. Thus, let me present a few results and make a practical suggestion.

In the Chicago area twenty plants account for about 90 percent of damaging air pollutant emissions. There is thus a very high concentration of pollution among a few sources. Nationwide about eighteen industries have been identified as major polluters.

Some of the polluting industries tend to be location-fixed. But many are not. In considering where to locate polluting activities, a major area where there is a possibility for doing something is the utility industry. All the siting controversy and siting requirements for utilities do represent spatial adaptation to pollution, and we are in fact adapting spatially by locating power plants out farther and farther away from heavy population concentrations. By that I do not mean in Wyoming, but rather on the edges of the metropolitan area out in Illinois somewhere. There are other major plants that are not location-fixed and that have very heavy pollution. Cement factories, for example, can locate in a variety of different places. Incinerators can also. Sometimes we run into constraints on spatial adaptation. Steel mills, for example, are never going to locate out in DeKalb County or some other such place. They are going to have to be near the cheap water transportation, and thus we run into location fixities. So as far as the stationary sources are concerned, we do narrow down to a few major polluters whose location can be varied, a point to which I will return.

With regard to auto pollution, we can with oversimplification speak of two different situations. First, there are the older, eastern cities built up before the time of the automobile, of which Chicago is one, which have heavy concentrations of carbon monoxide in the central business district. Second, in the newer, more spread out cities of the West, there is not so much of a carbon monoxide problem, because there is not the centralization. Rather, a hydrocarbon smog is encountered, that spreads over the whole area of the city, not just being concentrated in a single part.

My co-worker, Alan Cohen, and I carried out an experiment in urban form in which we asked ourselves this question: What would pollution in Chicago be like under two different urban forms? These forms were: (1) roughly the form we have

now, where Chicago is the hub; (2) a situation where the growth was dispersed to satellite cities like Joliet, Aurora and Elgin.

We have found that sulfur dioxide and particulates, the pollution from the so-called stationary sources, is really not very much affected by decentralization. A basic reason is that the steel industry is responsible for so much pollution, and steel mills are not movable from the lake-fronts. Further, power plants are also responsible for pollution, and they are already being located on the edge of the metropolitan area and even outside of it. So there is limited scope for any kind of major effect.

Regarding carbon monoxide, which is the major mobile source problem in Chicago, there was a more substantial effect, but it was still true that Chicago remained above the standards and that the satellite cities remained below them. A major conclusion is that overall major urban form strategies do not appear to affect pollution levels very much.

The study leads to a practical suggestion. The suggestion is I hope refreshingly more practical than a recommendation for pollution taxes. Ever since Pigou, who emphasized the divergence between social and private costs, there has been great academic interest in taxing that difference, an act which will give incentives for firms to reduce their pollution to an optimum extent. The thinking has been that if you just make that little correction in the system, then Adam Smith's would be restored. So for a hundred years now the taxation approach has been widely advocated in economic journals. Yet pollution taxes have not caught on, for justified reasons I will not go into here. As a practical matter, we may have to face the fact that pollution taxation is not going to be the major approach in the near term. Land use policy and the kinds of standards approaches that we have been talking about today are serious, practical approaches.

Are there principles that can guide these practical approaches? Three suggestions might be used to formulate land use measures having to do with pollution.

The first is that the area of jurisdiction should be at least as big as the area of effect, so that, for example, if a steel mill is polluting a one-hundred mile square area, then the people involved in making a decision about that area should come from all over the region. In examining some of

the effects of pollution in various parts of the Chicago SMSA on land values, we have found that the jurisdictions are too small. The most distressing one we have found is that in the Indiana part of the Chicago metropolitan area, which contains the steel mills in the Gary area, the activities are having depressing effects on land use in the Chicago area. The present state-by-state approach makes it difficult to solve.

The second principle is to consider restricting the polluter rather than the person who is damaged. Some people have said that you should keep people away from polluting factories, for example, by zoning ordinance, because they create damages when they move closer. My second principle, on the other hand, would not be to do that. Act instead on the polluter. Time prevents me from giving a justification of this principle here.

A third principle is to give polluters incentive to take account of siting in where they locate, and this leads to the practical suggestion emerging from the urban form study. In policies to date, there has been resistance to the notion of following this idea of siting as an approach to pollution. "Dilution is not the solution to pollution," many people say. Perhaps we should say, "Wait. Dilution may be a solution after all." As implied above, dilution or spatial scattering for large utility plants has in fact been followed as an approach. The practical suggestion is to extend siting requirements to other major polluters, giving them incentives to move to areas where they cause low damages. In contrast, the present approach tends to keep most polluters where they are.

Finally, improvements could be made in methods of making decisions, allowing explicitly for a trade-off between control in place and where you locate.

In closing, let me point out that this suggestion applies the recommended trade-off approach among the three ways of controlling the environment. The suggestion is an attempt to make it possible to do something about the environment in the years to come at a cost much lower than the high costs now being severely resisted. If we will look for low-cost approaches, then those espousing each of the extreme, opposing poles regarding the environment mentioned at the outset will find satisfaction.

SOME PERSPECTIVES ON VIEWING POLICY-MAKING AND THE ENERGY CRISIS

JONATHAN ELA
Sierra Club

I would like to discuss some perspectives on how one looks at solving problems, how we make a judgment as to which short-term approaches are adequate and which are not, and how we tie in what we do today with what we are looking for tomorrow.

The first thing that has to be said is that it is extremely difficult to make a distinction between a short-term and a long-term problem or solution; in fact, I think that one of the difficulties we face as a result of our administration's lack of prescience is that this short-term-long-term concept is terribly blurred. We are being led to believe that we have an energy crisis that either is over—it has now become a problem and is about to become a situation—or at least is going to be comfortably in hand by the end of the year, by the end of the summer, or whenever. The implication is that all we have to do is tighten up our belts a little for a while longer and then the land of milk and honey will continue as it has before.

Well, I do not believe this to be the case. The decisions that we make now, and that the administration is presently in the process of making, not only are going to fail to alleviate the current energy crisis, but they are going to guarantee that our long-run problems are more difficult than the short-term difficulties which we are now facing.

In a way it is rather misleading to talk about a long-term issue or problem at all, because from an operational point of view there is really no such thing as the long term. There are an infinite number of short terms stretching on into the future, which make it very difficult to predict what a long-term solution will look like. That is, the short-term decisions that will be made starting today, tomorrow, next month, or next year, make such prediction extremely problematical. It is difficult or impossible to lay out a kind of concrete battle plan to reach utopian goals by the

end of the century, for such a plan ignores the innumerable short-term crises and decisions that lie before us in the intervening years.

What we must concentrate on right now is developing a general sense of the direction in which we want to move, and then we must structure today's short-term decisions so that the next series of short-term decisions can be made more easily and more to our advantage in moving in that general direction. The result of this approach would be not to spell out a rigorous prescription of what the future should hold, but rather to aid ourselves today so that we can have better decisions made tomorrow. It is critical for us, as environmental groups and public citizens, to build the political tools today that will help us make better decisions each step along the way as we move into the future. We should not try to make the distinction between short-term and long-term as two different kinds of processes, but rather we should tie them in together as closely as we can and then work pragmatically, a step at a time, in a general policy and political direction that is aimed at helping us in the future.

Today we do have decisions that can and must be made. What kinds of short-term actions will help us guide the future, and what kinds will hurt us?

One thing that we must avoid is what I call the "shazzam" hypothesis: that at some time in the future, no matter what happens in the next few years, we will find the ultimate answer. We must be prepared to accept short-term environmental losses today according to this reasoning, and must recognize that current technologies, such as strip mining and nuclear (fission) reactors, are necessary stopgaps only for the next couple of decades. Somehow, science will find the ultimate energy answers independently of these interim technologies, and these answers will provide unlimited energy virtually free of environmental

costs. I personally am dubious, for I doubt that any of the long-term technological solutions will provide limitless energy, or that they will prove to be environmentally free of cost. Fusion, though it may look hopeful, is going to have tremendous problems. The breeder reactor is in many respects the most sinister alternative future that we can be developing. Even solar energy is likely to run into many problems of application. In short, I believe that we must realize that we will always have an energy-vs.-environment problem which involves a complex pattern of interactions, and that the future nature of that problem cannot be divorced from the so-called interim technologies we determine to employ today. We must avoid a stance that is technologically utopian.

Another general problem which we must avoid is the "be reasonable, do it my way" syndrome that we are currently hearing from the major utilities and major energy companies. They are saying that environmental standards have been too tough, and that we must compromise. In fact, what is being discussed is not really compromise at all, but rather capitulation. We are being asked not so much to give a little here and a little there in order to get something back in return, but to give up on all of the gains that we have made in the last few years and say that we are just leaving the ship—that it is not important to us anymore. I think Dr. Briceland was really alluding to this attitude when he spoke of new initiatives coming out of the Federal Energy Office which will be in the guise of compromise but which will in fact be asking us to desert all of our objectives.

A little anecdote will help illuminate this point. I know an individual on a governor's staff who was in a meeting of the National Governors' Conference Natural Resources Committee, representing his governor at the White House as energy problems were being explained. One of the people who spoke to the assembled governors and their staff was President Nixon himself.

The President said (and this is a direct quote). "What we are going to come up with in terms of solutions to the energy problem will drive environmentalists up their trees." I think that this comment is something to keep in mind.

This suggests, in terms of the policies we make now, that we must be specific on anything on which we yield. If we have to issue a variance, let us make certain that it is not a precedent to other variances, that it is not going to commit us to a general policy of variances from now on into the future, and that we keep the political thrust headed in the right direction and do not start a political thrust in the wrong direction. Widespread variances which make us prove our case will be highly disruptive: we should make the other side prove its case every step along the way. We must hold firm to our principles on land use planning, strip mining, and the like, for there will be little yielding on the part of our environmental opponents.

Further, I think that there are certain sorts of procedural and decision-making reforms which we must achieve now in order to make the next step in decision making, the next short-term crisis, more manageable. One is public information. We must expose the fallacies in measures like the Emergency Energy Act, which not only is environmentally harmful but fails to do anything for the energy crisis as well. Second, we must change not only those who are making the decisions in government, but those who are forcing them, who are defining the political issues. At present these forces tend to be the energy companies, which have a vested interest in where our futures lie. We must look very carefully at the antitrust implications of the fact that a very few companies are controlling the large majority of our total energy resources. Above all, we must open policy making to the public so that we can all continue to work on energy problems, and to move toward an environmental future that is more palatable than the one presently being slated for us.

THE EFFECTS OF THE ENERGY CRISIS ON POLLUTION REGULATION

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I would like to begin with some quite general remarks concerning the nature of energy use, and then work down to what seem to me to be the important questions of energy and the environment. My most general remark is that unlimited exponential growth in any physical activity is impossible. As a more concrete proposition this means that energy use in the United States cannot indefinitely continue to grow at 4 percent, 1 percent, or for that matter at any steady rate for an indefinite time. At some point a plateau will be reached, presumably along with GNP. We have by no means reached this plateau, although in terms of a timetable of mankind's history it is probably not far off. The best guess seems to be that the plateau will involve a rate of energy use 60 percent to 100 percent greater than the current rate of use. (See M. King Hubbert, "Energy Resources," in *Environment: Resources, Pollution and Society*, ed. William W. Murdoch [Stamford, Conn.: Sinauer Associates, Inc., 1971].)

For the immediate future I confidently predict something approaching an energy glut within the next ten to fifteen years. This prediction is not based on any particular knowledge of technology, but on economic theory and past experience. The history of reported shortages are legion, so that with regularity some commodity such as sulfur becomes the subject of articles such as "Adjustments to the Permanent Sulfur Shortage." The common result of this concern is that a few years later there is an abundance of the commodity. In the case of sulfur, you can hardly give the stuff away.

In the meantime we have an energy crisis, problem, or situation. In my view this crisis is compounded by (1) lack of foresight by the oil industry in overreacting to a previous leveling-off of demand; (2) government policies such as

the fixed, low price of natural gas; (3) formation of the Organization of Petroleum Exporting Countries, for which the State Department and the oil companies must share the blame; (4) the present rationing and allocation activities of Mr. Simon and the Price Board.

In a general sense the biggest danger of the energy crisis is that a number of parties have, I think, a vested interest in maintaining the social attitude of crisis, and in these circumstances much of the public support for environmental concerns is bound to be lost. This loss, of course, would be exceedingly unfortunate because the environmental movement is only as strong as is its support from the general public. Indeed this mood has already had some negative and serious consequences. Important examples are the quick approval given the Alaskan pipeline under less-than-ideal conditions; reports that the Interior Department is ready to allow more oil drilling in the Santa Barbara Channel, site of one of the country's most dramatic oil spills; the current Congressional support for a super-port for oil tankers with the threat of super-oil spills; the tremendous internal and external pressure on the state of Delaware to modify or remove its restrictions on location of industry along its coast. These of course represent only a partial list.

Perhaps the single most important threat, however, is represented by the Federal Emergency Energy Act. The history of this legislation is chaotic. The House held only six days of hearings, in which more than a hundred amendments were considered. The Senate held only a one-day public hearing. The one good feature of the bill in my opinion is that it will delay the implementation of the 1975-76 clean air standards for automobiles. I favor this action because (1) the effects of these standards over the

next six or seven years will be small; (2) the costs of these standards are high; (3) a secondary but potentially important adverse effect is represented by technology associated with these standards, in that the catalytic mufflers with the platinum catalyst will produce sulfuric acid, one of the most damaging of pollutants, as well as small platinum particles. However, whether or not this provision of the bill is desirable is irrelevant, in the sense that enacting such a delay does not require passing the whole energy bill.

The other provisions of the bill are extremely objectionable. This legislation is designed to give the President and the Federal Energy Administrator the authority to implement various programs designed to conserve energy and thus to alleviate the current fuel shortage. The bill, instead of merely allowing industrial facilities and power plants to burn coal rather than oil or natural gas during the emergency, *requires* the Federal Energy Administration (FEA) to order facilities to burn coal; and any plant that switches to coal may not have to install pollution control devices until 1979. The bill virtually prohibits the Environmental Protection Agency (EPA) from shutting down a plant.

The bill also inexplicably and wrongheadedly removes the authority of the EPA to require transportation control to meet the air quality requirements. These controls involve selected local strategies for reducing emissions. In particular, they involve (1) inspection and maintenance of automobiles, (2) traffic flow strategies which increase vehicle speed in the central city, (3) increased use of mass transit and (4) selected taxi or truck rescheduling, retrofit, or fuel con-

version strategies. The major point is that every one of these strategies involves fuel savings. Moreover, they represent methods of reducing transportation pollutants in major city centers that are considerably cheaper than the federal new car standards. (For an analysis of these policies, see R. O. Zerbe and K. G. Croke, *Urban Transportation for the Environment* [Cambridge, Mass.: Ballinger Publishing Co., 1975].)

I would like to end by noting two specific areas for concern, especially at the state level. The first area involves the granting of emission variances by states. There has been and is bound to be some granting of energy-related variances. I am optimistic that for the most part these will be judicious decisions. The area where I am not optimistic and which is extremely important involves mining regulations, especially for strip mining. The pressure is very great here to get on with the mining at any cost. In many cases it is not simply a matter of relaxing old regulations, but one of a continuing need for new regulations that have never been passed. In the current climate these regulations are going to be hard to come by. This situation is unfortunate, because the current climate is overly sensitized by the way in which the energy crisis has been handled. There is no reason—no excuse—for the country to pull back from its environmental goals. In many respects the energy crisis can be used to advance goals in areas such as desulfurization of coal. Environmentalists should look to the good in this ill wind if we are not to lose our hard-won gains.

DANGERS OF THE "CAN DO" SYNDROME

A. DAVID ROSSIN

Commonwealth Edison Corporation

Our chairman spoke of the diverse backgrounds of the various speakers today. This is interesting because John Roberts, Ed Croke and I worked very closely together at the Center for Environmental Studies at Argonne for a couple of years. Steve Hastings once was head of the department that I am in at Commonwealth Edison. I would say that all of us have had disagreements in the past in many areas and probably still do, but we have all been on common ground from time to time as well. As for "Energy vs. Environment," our topic today, I feel that there is going to have to be a substantial amount of give and take on both sides. That is what I want to discuss.

I had a title for today's talk which I thought I was going to need. I'm glad I don't. The best I could come up with was "The Impossible Takes a Little Longer." This was a slogan back in World War II of the construction battalions who worked under combat conditions. It is kind of a basic American philosophy. Translated into today's world it says that given money, guts and Yankee intuition, we can do anything. Sometimes we persist in trying long after it becomes evident that the effort is really not going in the right direction.

I thought of a couple of examples, like Howard Hughes's famous plywood seaplane, or the nuclear powered airplane. Well over a billion dollars of the taxpayer's money was spent back in the 1950s (and that was when a dollar was still a dollar). It took a number of years to cancel that program, even after the foolishness of the program had been well established and was well understood. If you want a more political example, just reflect on the United States in Viet Nam.

The environmental laws are generally excellent pieces of legislation, but I think that in places they have fallen prey to this "Can do" syndrome. The Clean Air Act Amendments of 1972 were passed in response to public pressure that said that the 1967 Clean Air Act, which I

think was a real step forward, was not making fast enough progress. You have to remember that the 1967 Act was passed two years before the United States got its environmental conscience. It was in the works three or four years before Earth Day, 1970. It was a very ambitious law for its time. The automotive emission standards that are in the 1972 Clean Air Amendments are probably a classic example of the "Can do" syndrome. These standards were set despite a massive record in the legislative history that showed that they were unworkable, that they were an attempt at overkill, and that they would inflict severe energy and economic penalties on the United States for very marginal benefit.

But the "Can do" syndrome was there. So now we have a contributing factor to our gasoline shortage. We have rotary engines that don't save gas, and we have an admission by the EPA that the nitrogen oxide ambient air quality standards (which were part of the thinking at the time) really don't have a basis in fact. The original hearing record shows this pretty clearly. I think it's precisely the kind of arbitrary percentage reductions that were incorporated into the Clean Air Act, and the impossible deadlines that were incorporated with them, that have brought some of today's pressure on environmental legislation.

John Quarles, the Deputy Administrator of the EPA, says that it is "inevitable that at some point resistance to change would out-balance the drive for change." I think this is nonsense. If change is important, and it is evident that we need change, then let's do it. It just doesn't make any sense to say that once we have passed a law that we have to stick with it even after we find out that it is the wrong thing to do.

Let me talk about sulfur dioxide removal for a minute. Instead of developing the technology, the Environmental Protection Agency set some very strict deadlines. The technology, in Commonwealth Edison's opinion, has not been de-

veloped to the point where it is viable. However, because of the deadlines, because of the structure of the law, and because of the implementation plans that are now on record, the EPA is under tremendous pressure to explain that sulfur dioxide removal technology is here and available, or to admit that it has written off vast coal reserves just at a time when we face an energy crisis.

What would have happened if the Atomic Energy Commission had decreed that nuclear power would be commercial by 1960? The coal industry got depressed in the late 1960s when they saw nuclear power making inroads. But a decree ten years earlier would have wiped out coal production in an industry that needs long-term capital commitments in order to do anything, an industry, it is now clear, that we need for a long time.

In Britain, the 1956 Mideast war forced just such a decree. The British said "Nuclear now," and they really couldn't wait. The result was some large gas-cooled reactors that were built on 1945 technology, each much less than half the size of the commercial power plant reactors that are being built today, and each now derated by 30 or 40 percent because of materials and operating problems.

There is no coal-burning utility that has a greater interest in burning Illinois coal than Commonwealth Edison. This year 40 percent of our coal came from Wyoming and Montana rather than Illinois. It is expensive, there are logistical problems, and its performance in our boilers is worse than that of Illinois coal.

If there were a reliable stack gas scrubber on the market, Commonwealth Edison would buy it and install it. The utility industry and Edison have been accused of foot-dragging when it comes to installation of scrubbers. I consider such accusations to be false and without foundation. Perhaps the subject will come up again in our discussion period.

What if the utilities' evaluation of the state of the art of scrubbers has been honest *but wrong*? What if in two years a process that is being promoted today is proven reliable, and utilities then proceed to install that type of unit. Perhaps three years will have been lost during which SO₂ emissions could have been burned that weren't burned.

What if the EPA is wrong? What if, against our technical judgment, we are forced to buy a

1974-model scrubber? I would like you to consider for just a moment a power plant at our Powerton Station. It is an 850-megawatt plant and will come on line next year. We can invest \$45 million on a scrubber—this on top of a capital budget that is so big we are struggling to raise all the funds we need as it is. If this unit is in by 1978, and if it works fine when it works but suffers more outages than the generating unit, then we have some trouble. If EPA grants a variance to run the unit intermittently when the scrubber is out, except of course during air pollution stagnations or when the unit needs to be shut down to fix the scrubber, then we can keep running. (We'll have the sludge to dispose of in any case.) We lose 50 megawatts out of 850 for the power to run the pumps and fans, and for the loss of thermal efficiency in the plant, some of which will have to be made up with oil. If we take Professor Hartnett's warning or Ed Croke's comments about the need for improved efficiency seriously, then I think we should very carefully weigh this energy tradeoff. That's the favorable scenario. The more unfavorable one is that the scrubber in fact does not perform and we have to write the thing off.

It has been said that industry is trying to use the energy crisis to tear the guts out of environmental legislation. I have heard those words many times and so have you. I would like you to consider the possibility that the Congress of the United States is not infallible. Congress has from time to time passed some less-than-perfect laws, and the one I want to devote the rest of my couple of minutes to is the Water Quality Act Amendments of 1972. They embody some very fine policy. However, this monumental act has some basic flaws.

One such flaw is the concept of "best practicable technology," which sounds magnificent to the electorate, but really does nothing but buy time. To implement such a concept, the Administrator must ultimately promulgate guidelines, which means that sooner or later the bullet must be bitten and "best" must be reduced to specifics. This is currently being attempted.

The second basic flaw is the concept of "zero discharge." This also sounds marvelous, but it defies the second law of thermodynamics. This may be OK for Congress, but it doesn't fool Mother Nature.

A third basic flaw lies in the definition of heat

as a pollutant and its treatment like any chemical pollutant. Having fallen into this trap, the framers of the bill wrote a loophole offering an exemption from "best" on heat if the applicant could prove "no significant harm" to his local ecosystem. The result is a very cumbersome exemption process that should exempt at least 90 percent of the sources. However, this is being done in order to overcome a very foolish provision that was written into the law in the first place. If changes to this law are necessary, I believe they should be made.

The people who drafted this law claimed that the Water Quality Act was unique. It would clean up our waters by technology-based standards; that is what "best practicable technology" is. The resulting quality of the water itself is not a consideration; every discharge should ultimately be eliminated; we should do things in the most stringent way we can, whether we need to or not to protect our environment.

If there is one thing that the environmental awakening has taught us, it is that we must consider the total system, that everything we do has complex environmental impacts. We learned that replacing one problem by another is not necessarily a solution.

As with stack emissions and auto emission controls, thermal regulations will extract a high cost in energy waste, additional fuel use, and commitment of capital that can do better jobs for our society in other applications.

My recommendation is a challenge to you. Many of us took up the environmental crusade several years ago. We did some serious homework. If we are to stay a credible voice, I think we had better keep up with our homework, and not depend solely on our emotions to determine what provisions of law we need and what provisions we should support.

ENERGY AND AMERICAN VALUES

BOYD R. KEENAN

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As a political scientist, it is my opinion that in the long-term energy policy arena there are two basic issues involving the federal government. The first is the question of which federal agency is going to emerge as the chief research organizational agency in the strategy for researching environmental and energy affairs. The second one, it seems to me, is the determination of just how deeply the federal government is going to get involved in managing energy operations on a day-to-day basis.

On this second point, I am much in sympathy with the kinds of problems that the oil firms and other energy corporations will face in the future. But it seems far from clear just yet what the wisest public policy might be. The relationship between management of energy and some of our most cherished values has yet to be grasped by most of us. For instance, many of the so-called energy information bills that are being thrown into the Congressional hopper make it mandatory for the petroleum corporations and others to report their data in various complex categories. Apparently, under certain of these proposals, some of the material would be reported in a way that it could later be made public, some would be "quasi-secret," and still other data would be classified as "secret." It is quite possible that we may get into a morass of retrieval procedures involving sensitive information unlike anything that this government, or any other government, has ever faced before. So, while recognizing the desirability of corporate accountability, I think that we ought to be a bit sympathetic to the kinds of problems that are going to face the companies as they are asked to provide new data. And we should keep foremost in our minds the possibility of reshaping basic American values as we tinker with the complex apparatus that we call the energy industry.

When asked to take part in this seminar, I of-

fered my opinion that the most serious problem was perhaps really a philosophical one—or even a theological one. Yet, I notice that we have omitted theologians, artists, poets and psychologists from our program. Very seriously, I think that if we are really concerned about the topic of this conference, then we should recognize that the most difficult environmental implications do relate to matters of philosophy, religion, and psychology.

Most of us have not bothered to go back into the history of American and world literature to determine whether any artists or other thinkers might have anticipated the kind of situation that we have suddenly discovered and faced in the past six months. For example, if we had checked into American literature, we would have noted that a man named Henry Adams predicted in the year 1907 that energy, or the "dynamo," as he put it, would challenge every ideological value in American society. Well, somewhere in the world of ideas, we rather forgot Henry Adams between 1907 and 1973 and his observation has been neglected. Perhaps at least a few of you do remember that he entitled a chapter "The Virgin and the Dynamo," in a book called *The Education of Henry Adams*. The significance of the symbolism and substance of such a title need not be reviewed here.

In a play entitled "Dynamo," which lasted just one night on Broadway in 1929, Eugene O'Neill made this same kind of declaration, asserting that the one really big issue in American civilization is how this country is going to handle energy, or "force," as he sometimes called it. O'Neill later said in a biographical note that his greatest single disappointment was that the American people failed to understand what he was attempting to say. Instead, he claims, they accused him of all kinds of "pie-in-the-sky philosophizing" in that play.

Recently, in his book *Of a Fire on the Moon*, Norman Mailer argues that the incomprehensibility of the handling of energy is the greatest challenge facing modern man. Mailer certainly has no answers to offer but, in his literary madness, he may have some clues as to the scope of the problems with which we are dealing. For instance, he puts the twin problems of energy and environment at the foot of a basic characteristic of human nature—hence my desire to get some theologians, philosophers and psychologists into the discussion. Mailer says that, at the bottom of these issues we have been discussing in this conference, is the “itch to accelerate.” I would suggest that this observation is worthy of some consideration. Whether or not this “itch to accelerate” is appropriately labeled, the key to management of these matters is indeed embedded in the kinds of questions which we shall be discussing in our schools, our churches, our temples and our synagogues in the years ahead.

I shall conclude with one last anecdote. (It is a true story and is not exaggerated.) Last summer, after having decided essentially that these questions are mainly philosophical, I happened one day to be driving on Interstate 465 around In-

dianapolis, Indiana. It was a warm day and I was lulled into a sleepy state while driving along behind a huge tractor-trailer rig. The engine was spewing out a black cloud that, to the layman, looked like gross pollution. The driver was having a difficult time holding the rig on the road, periodically going off and back onto the road in such a hazardous manner that I was unable to pass. I was wasting both fuel and my own energy in speeding up and slowing down.

After several miles, I thought, “Just what is it that American civilization needs so badly that it would attach such value to this commodity as to let this traveling monster function on the highway, consuming much fuel and polluting the air?” Perhaps, I thought, medical supplies being hurried to a distressed area or at least foodstuffs that would enrich the lives of those receiving the shipment. In any case, it struck me as never before that basic values are at the center of every question relating to energy and the environment. Finally, when at last I managed to pass the truck after expending much time and energy, I glanced at the side of the cab and read these words: “The Acme Casket Distributor Corporation.”

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